GOVERNMENT/INDUSTRY AERONAUTICAL CHARTING FORUM
Instrument Procedures Group
(Originally presented at ACF 92-02)
HISTORY RECORD

FAA Control # 92-02-110

SUBJECT: Cold Station Altimeter Settings

BACKGROUND/DISCUSSION: The United States Air Force and the Canadians apply corrections to minimum instrument approach altitudes from the FAF inward, during periods of very cold weather conditions, or cold weather conditions in combination with terrain more than 2,000 feet above airport elevation. Where terrain significantly higher than the airport elevation underlies approach segments the problem is exacerbated. At Medford, Oregon, for example, there is terrain that is 6,000 feet higher than the airport, which underlies the intermediate segment of the VOR/DME-C SIAP. The minimal 500 feet of intermediate segment obstacle clearance can be completely compromised with a surface temperature no colder than -5O degrees c.

RECOMMENDATION: The FAA should institute a directive procedure similar to that used by the USAF for cold weather operations. Where individual SIAPs are identified to have minimal obstacle clearance over terrain that is greater than 2,000 feet above the airport elevation, such procedures should be annotated to apply cold altimeter corrections to the intermediate and initial approach segments, in addition to the FAF inward.

COMMENT: This recommendation would affect directive information contained in the Airman's Information Manual pertaining to the use of instrument approach procedures. It would also affect FAA Order 8260.19B to the extent that flight procedures personnel would be directed to identify and annotate SIAPs that have significantly high terrain underlying intermediate and initial approach segments.

Submitted by: Charles K. Guy
May 13, 1992
AIR LINE PILOTS ASSOCIATION

INITIAL DISCUSSION (Meeting 92-02): Records of the initial discussion and minutes of meetings 93-01 through 94-02 are not available.

MEETING 95-01: Mr. Lyle Wink, AVN-220, agreed to research this on-going problem, pending a study by AVN-100. He will also look into the possibility of a conversion chart. ACTION: AVN-220.

MEETING 95-02: Lyle Wink, AFS-422, outlined concepts; however, due to the AFS/AVN re-organization he did not have sufficient time to prepare a full briefing for this meeting. Report deferred to the next meeting. ACTION: AFS-421.

MEETING 96-01: Lyle Wink, AFS-440, led Discussion on this issue. Criteria development is in progress but not mature enough to be presented to the group. Every attempt will be made to present draft criteria at the next meeting. ACTION: AFS-440.

MEETING 96-02: Lyle Wink, AFS-440, briefed that the initial criteria they had developed was too broad in its application and needs further refinement. Don Pate, AFS-450, noted that he had recently attended an ICAO Obstacle Clearance Panel (OCP) meeting where this issue was discussed. To date, there is no international consensus on this issue. ACTION: AFS-440.

MEETING 97-01: Jim Nixon, AFS-440, briefed that criteria development is progressing, albeit slowly. He noted that the impact on BARO-VNAV must now be addressed. Areas of concern are the possibility of a requirement for dual minimums and the impact on VDP's and descent angles. Jim stated that AFS-440 hopes to have criteria development completed by the end of the year. ACTION: AFS-440.

MEETING 97-02: Jack Corman, AFS-440, briefed that criteria development is progressing. He noted the following recommendations: 1) Publish a temperature adjustment chart in the front of the approach booklets; 2) Publish instructions in the AIM specifying how and when to use the chart; 3) Have air carriers identify locations exhibiting significant indicated altitude error, and make the following annotation on approach charts at these locations: "USE TRUE ALTITUDE WHEN AIRPORT TEMPERATURE IS BELOW ISA". Pilot education issues have to be addressed. Recommendations were well received and initiatives are to be work further. Don Pate, AFS-440, expects to present proposed criteria at the next meeting. ACTION: AFS-440.

MEETING 98-01: Jack Corman, AFS-420, briefed that criteria development is progressing, and presented a developmental conversion table for group review. Initial reaction from the group is that the table shows steps are being taken in the right direction. Jack noted that the recommendation to: "Publish a temperature adjustment chart in the front of the approach booklets; publish instructions in the AIM specifying how and when to use the chart; have air carriers identify locations exhibiting significant indicated altitude error; and make the following annotation on approach charts at these locations: "USE TRUE ALTITUDE WHEN AIRPORT TEMPERATURE IS BELOW ISA" is still on the table. Wally Roberts, ALPA, recommended implementation prior to next Winter. Jack briefed that several air traffic issues as well as pilot education issues have to be addressed. The AFS-420 recommendation for a subgroup on this issue was adopted. AFS-420 will continue criteria development, as well as establish a working group to address implementation, and provide an updated report at the next meeting. ACTION: AFS-420.

MEETING 98-02: Due to higher priority issues, AFS-420 has not had sufficient time to work this issue. Howard Swancy, AFS-420, briefed that the U.S. is considering the Canadian, Russian and ICAO models for acceptance. Rule-making and an Advisory Circular are also being worked as promulgation methods. It was noted that the rule-making process will take 12-18 months. Another meeting of the ad hoc group studying this issue is scheduled for

next month. Hopefully some interim adjustment measure will be available by the end of the year. ACTION: AFS-420.

MEETING 99-01: Howard Swancy, AFS-420, provided a hard-copy handout outlining progress on this issue. He also provided a briefing on actions within the ad hoc committee (co-chaired by AFS-200 and ALPA) along with specific examples of near terrain impacts and a sample corrective table. Implementation of a national cold weather adjustment plan is hoped for by October, 1999 with public awareness training beginning in May, 1999. Don Pate, AFS-420, emphasized that whatever is adopted/published in the U.S. must be harmonized with ICAO. This issue will be addressed at the ICAO OCP/12 meeting. While working this issue, it was discovered that another industry/government working group was also unilaterally addressing this issue, unbeknownst to the ACF. Kevin Comstock (ALPA) indicated that it was counter productive that another group was addressing this issue in secrecy when he has repeatedly requested input from all sources. This demonstrates once again where the effectiveness of the ACF is limited by attendance. ACTION: AFS-420.

MEETING 99-02: Howard Swancy, AFS-420, briefed efforts thus far. There is a draft Advisory Circular (AC) currently in FAA internal coordination. Air Traffic still has some issues to resolve; however, a representative was not available for discussion. Flight Standards is still working with ATA-130 for charts in the TPP booklets. The FAA is still targeting implementation by the end of November. ACTION:AFS-420.

MEETING 00-01: Howard Swancy, AFS-4, briefed efforts thus far. There was a draft Advisory Circular (AC) circulated for comments. Comments have been received and a new AC is currently under development by AFS-420. The FAA was targeting implementation by the end of November, 1999; however, the issue is contentious and formal adoption was not realized. The plan now is to educate the aviation community this summer and implement procedures next winter. ACTION: AFS-420.

MEETING 00-02: Dave Eckles, AFS-420, presented a status update paper prepared by Carl Moore, AFS-420. A comprehensive FAA policy for cold weather induced altimetry is still under development. Informational material regarding cold temperature induced altimeter error and a cold temperature error table will be published in the January 2001 AIM. When questioned, Deborah Martin, Transport Canada, briefed that cold weather altimeter procedures have been in use in Canada for some time without problems. She stated that this is due to extensive pilot and controller education programs. Kevin Comstock, ALPA, asked who is working the issue formally for FAA and requested the status of the draft AC on this issue. He further stated that his organization would like to see more aggressive action on this issue and recommended a FAA sponsored ad-hoc group be formed to work the issue. Dave responded that he is uncertain of the status of the AC and that AFS-420 will take initiative to lead the effort and consider establishing a formal FAA/industry group to work the issue. ACTION: AFS-420.

MEETING 01-01: Dave Eckles, AFS-420, briefed that Carl Moore, AFS-420, has been assigned to work this issue. Brad Alberts, FedEx Pilots Assn., asked when the FAA would have something in writing. Kevin Comstock, ALPA, again briefed that this issue must be

worked with input outside of AFS-400. He noted that ALPA has repeatedly requested that an ad-hoc FAA/industry group be formed to work the issue. Dave agreed to carry this message back to Carl. ACTION: AFS-420.

MEETING 01-02: Norm LeFevre, AFS-420, briefed that Carl Moore, the AFS-420 specialist assigned this issue, has proposed that procedures be designed with a cold temperature adjustment. The final approach segment altitudes will be adjusted by the pilot based on current temperature. Other procedure segments would include year round adjustments based on the mean temperature minus 3 standard deviations. Statistically, if this were followed, there would be only 12 hours per year where the adjustment would be insufficient. Carl's analysis indicates that segment altitudes, other than final, already have adjustments (airspace, ATC, etc.) that in most cases preclude the necessity for an additional cold weather adjustment. NACO has provided a list of terrain impacted airports, which will be ranked based on temperature and terrain, and then AFS-420 and AVN-100 will discuss implementation alternatives. Kevin Comstock, ALPA, once again briefed that this issue must be worked with input outside of AFS-400. He noted that ALPA has repeatedly requested, to no avail, that an ad-hoc FAA/industry group be formed to work the issue. Norm agreed to carry this concern back to AFS-420. ACTION: AFS-420.

MEETING 02-01: Norm LeFevre, AFS-420, briefed that the FAA had a meeting in mid-April to discuss some Baro-VNAV temperature compensation test results from the FAA Technical Center in Atlantic City. AFS-420 is coordinating to have Clyde Jones, the AFS-400 National Resource Specialist (NRS) for weather related issues, to lead this effort. Norm also stated that AFS-420 believes that a single point of contact should help move this effort and the weather NRS is the logical office to do so. If accepted, Clyde will be briefed that industry desires to participate in this effort and that AFS, ATP, AIR, DOD, ALPA and AOPA all have expressed an interest in this issue. ACTION: AFS-420.

MEETING 02-02: Tom Schneider, AFS-420, briefed that after the last meeting, AFS-420 wrote AFS-400 requesting that the National Resource Specialist (NRS) for weather related issues lead this effort. Pre-ACF conversation with Clyde Jones, who is currently handling weather issues, indicated that he had not been directed to assume this responsibility. Subsequent conversation between the managers of AFS-420 and AFS-400 clarified that Clyde would work this issue. As a result of the miscommunications, no progress has been made since the last meeting. Tom agreed to ensure that Clyde is forwarded all relevant ACF material as well as all background material from Carl Moore's efforts as the previous OPR. Kevin Comstock, ALPA, reaffirmed industry's concern over lack of progress on the issue and noted that currently, only the inner surface of the final segment has cold temperature adjustments included in draft 8260.RNP. ACTION: AFS-420 & AFS-400 Weather NRS.

MEETING 03-01: Tom Schneider, AFS-420 briefed that no progress has been made since the last meeting. AFS-420 has done all that is possible to work the issue from a criteria perspective; it is now an operational issue. The Manager of AFS-400 has been formally requested to provide an OPI to work the issue; however, one has not been assigned. Kevin Comstock, ALPA, suggested that adding an adjustment to allow a procedure to be used down to a predetermined temperature as is done with BARO-VNAV seemed a simple fix. Al

Herndon, MITRE, stated that some FMS auto-adjust for temperature. Mark Ingram, ALPA stated that his experience is that the pilot must input temperature. Tom will continue to pursue an AFS-400 staff assignee to work the issue. ACTION: AFS-420.

MEETING 03-02: Bill Hammett, AFS-420 (ISI), briefed that this issue has been transferred to AFS-410 for action. All past AFS-420 studies have been forwarded and AFS-410 has been advised of ALPA's willingness to assist in resolving the issue. Mark Steinbecker is the appointed staff specialist assigned to work the issue. He is currently reviewing the background to determine what operational procedural options exist. TAOARC and RNAV Task Force coordination is also planned. ACTION: AFS-410.

MEETING 04-01: Mark Steinbicker, AFS-410, briefed that his office has looked into the issue. There appears to be three options; 1) ignore the risk, 2) recognize the risk and mitigate via procedure design changes, or 3) incorporate operational changes through ATC/pilot procedures). The general consensus is that the risk cannot be ignored; therefore, the discussion focused on whether a solution would be criteria-based or operational. Frank Flood, Air Canada, stated that implementation of cold temperature adjustments is necessary because, as we move toward a RNP NAS, it is vitally important to know exactly where the aircraft is. Frank further briefed that Air Canada publishes a correction table in the front of their flight manuals. Pilots are instructed when and how to make adjustments. He also pointed out that awareness is essential and applauded efforts to educate pilots of the problem. Frank also mentioned a recommended procedure provided by ICAO. The pilot's own 'rule of thumb' is that -10 Celsius = -10% altitude error (too low). Vincent Chirasello, AFS-410, suggested the ACF decide on a recommendation that would be presented to the Performance-based Aviation Rulemaking Committee (PARC). John Moore, NACO, asked why the PARC. Kevin Comstock, ALPA, responded that the PARC is already addressing incorporating cold temperature adjustments in RNP criteria. If incorporated in RNP criteria, it should be applicable to all procedures. Of primary concern is that the greater the distance from the altimeter reporting station, the greater the risk of an altitude error induced by cold temps. Most affected are initial, intermediate and final approach altitudes. Unless a cold temperature adjustment is made, aircraft are flying too low and required obstacle clearance (ROC) as well as ATC separation is reduced. After discussion, the group agreed that the initial focus should be on procedural design followed by ATC procedures. Tom Schneider, AFS-420 recommended taking the Canadian procedures to the PARC. Mark Ingram, ALPA, stated that incorporating a correction in procedure design is preferred; however, the Canadian procedures could be used in the interim. Randy Kenagy, AOPA, questioned the safety and operational impact, emphasizing that data was needed. Kevin Comstock, ALPA, noted that the FAA's Atlantic City Technical Center has validated that the ICAO values are correct. Mark will take the ACF feedback to the PARC and report at the next meeting. ACTION: AFS-410.

Editor's Note: *At this meeting, Ted Thompson, Jeppesen, presented the following cold temperature related issue. The forum recommended that the new issue be addressed by AFS-410 concurrently with issue 92-02-110. Ted agreed. AFS-410 will respond to both issues under 92-02-110. The full text of the initial discussion may be viewed on the ACF-IPG web site under History of Closed Issues, Issue # 04-01-251.*

AERONAUTICAL CHARTING FORUM
Instrument Procedures Group
Meeting 04-01 – April 28-29, 2004
History Record

FAA Control # 04-01-251

Subject: ***Cold Temperature Correction Procedural Notes***

Background/Discussion: *Currently, cold temperature correction procedural notes on applicable U.S. FAA SIAPs state "Baro /VNAV not authorized below -XX°C." As currently worded the notes are often misinterpreted by pilots. The wording unduly singles out and penalizes newer navigation systems that provide the means to perform constant angle descents using VNAV. Pilots who encounter these notes/conditions may be inclined to divert to an alternate location entirely, or continue to the original destination but revert to a 'dive & drive' descent instead of using VNAV. Neither option is appropriate, as cold temperature conditions have an affect on all types of operations, including conventional 'dive & drive' procedures.*

Also, in some situations, the procedural notes may be included on approach procedures where extreme cold temperature conditions are highly unlikely to occur, such as airports in southern Florida. In these examples, credibility and effectiveness of the note comes into question.

Recommendations: *The ATA FMS/RNAV Task Force and the ATA Chart & Data Display Committee both recommend the FAA continue to actively address cold temperature correction procedures and coordinate an appropriate solution on an industry-wide basis, as well as on an international level. It is understood the subject is quite complex and solutions may be difficult to achieve.*

For example: The FAA should uniformly assess a baseline cold temperature. The condition does not relate exclusively to VNAV operations. Cold temperature procedural notes should be modified to address the need to use "appropriate cold temperature correction procedures" – in general – not just for VNAV operations. The same compensations should apply to conventional procedures.

Comments: *The subject was originally presented to the ATA FMS/RNAV Task Force by the Boeing Company. The Task Force's Chart & Database Compatibility Subcommittee reviewed the proposal, and coordinated with the ATA's Chart & Data Display Committee. The recommendation was endorsed by both the FMS/RNAV TF and the CDDC, to be carried forward for presentation to the FAA for consideration.*

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MEETING 04-02: Vinny Chirasello, AFS-410, briefed that his office submitted the issue to the Performance-based-operations Aviation Rulemaking Committee (PARC) and a task force was formed. FAA has received no feedback thus far. Kevin Comstock, ALPA, briefed that he was at the PARC when the issue was presented and the PARC tasking was limited. Kevin recommended that AFS-400 ensure that the PARC is aware that a comprehensive temperature compensation policy is needed to include required actions for all segments of an approach, other procedural minimum altitudes, ATC assigned altitudes, altitudes specified by procedure designers, avionics coded altitudes, etc. Frank Flood, Air Canada, offered his organization as a resource for the FAA on the issue. Ted Thompson, Jeppesen, commented that FAA Notice 8000.287 requires charting of both minimum and maximum temperature limitation notes. Ted noted that most maximum temperatures are extreme to the point of being comical, and of no operational value to pilots; e.g., some cases in excess of 158 degrees Fahrenheit. Ted suggested that FAA might want to re-examine the min/max temperature range values to be included in notes, or change the required wording of the notes to make them meaningful in the context of reasonable, real-world weather values while still addressing the potential affect on operations. The MITRE representatives supported Ted's comments. ACTION: AFS-410.

MEETING 05-01: Mark Steinbicker, AFS-410, briefed that, after the last meeting, the issue was presented to the Performance-based Aviation Rulemaking Committee (PARC). The PARC took no action. Discussion within AFS-400 indicates that all believe there is a hazard associated with cold temperature altimetry; however, the magnitude is undetermined. Discussion on how to attack the problem is ongoing. Mike Riley, NGA, asked what is the solution? Tom Schneider, AFS-420, responded that there are several solutions, all of which affect the ATC system. Mike asked if there is a band-aid fix that could provide temporary relief; e.g., a correction table in the approach charts. Mark stated that there was a Flight Safety Foundation (FSF) white paper study on the issue that documents actual aircraft altitude vs. indicated altitude. Mike stated that the issue has been on the agenda for over 13 years, if there is an interim fix, it should be addressed. Mark replied that there is a process under consideration to assess the impact at high-risk airports. Monique Yates, NGA, briefed that the USAF Advanced Instrument School (AIS) has an excellent class on the issue. The USAF courseware refers to at least 10 near misses with terrain in aircraft directly related to the cold temperature issue. The source for this statistic was ALPA. Monique agreed to put AFS-410 in touch with the USAF AIS representative to coordinate AFS-410 access to the USAF training material for review. Tom stated that the issue would be placed on the AFS-400 Technical review Board (TRB) agenda. ACTION: AFS-410.

MEETING 05-02: Mark Steinbicker, AFS-410, briefed that Flight Standards has not determined whether to pursue an operational solution (charted notes on procedures or pilot procedures to correct for temperature) or a criteria solution (adjust procedural altitudes to account for worst case expected conditions) to the issue. AFS-410 has requested a contract risk assessment analysis to determine the scope of the problem; i.e., the number of airports and air traffic facilities affected. However, the request did not make it into this year's budget and without funding; the project is in a HIA status. There is a possibility of receiving fall-out money for funding this year. There was much discussion on the issue as well as industry concern that FAA does not take the issue seriously. Monique Yates, NGA, stated that Canada and the U.S. military address the problem through pilot education and application of the ICAO Cold Temperature Error Table in the AIM (Table 7-2-3). USAF air

traffic controllers at northern tier locations broadcast “use cold temperature procedures” over the ATIS. Monique emphasized her point by noting an instance where a U.S. operator nearly struck a mountain while on approach in Canada because of not complying with cold weather adjustment procedures. Deb Martin, Transport Canada, confirmed that the incident occurred at Kewlona, BC and the aircraft was very close to impacting the terrain. Monique recommended that FAA initiate an effort to educate the flying public and air traffic controllers on the errors associated with cold weather altimetry in general. She also advocated using the ICAO Table within the NAS. Mark Washam, ATO-T, questioned the impact on ATC of applying the adjustment. Deb Martin replied that this has not been a problem in Canada as both controllers and pilots are educated on the subject. Cold weather procedures are effective for certain months during the year and all minimum vectoring altitude charts in Canada are temperature corrected. Deb volunteered Canadian support toward resolving the issue in the US. Kevin Comstock, ALPA, supported Monique’s recommendation. Kevin also questioned the need for another study as the Flight Safety Foundation CFIT and the CAST initiative have already conducted studies to assess cold temperature impact. Kevin offered to provide the previous study material to AFS-410. Mark stated that if procedure design is feasible, it is preferable in lieu of implementing pilot procedures. However, FAA needs to know the extent of the issue prior to expending resources; therefore, the need for the risk analysis. Mark emphasized that he did take the issue to the PARC for further support; however, that group decided not to work the issue. Kevin responded that other countries are applying cold weather corrections, how do we ensure that our pilots are trained? He recommended that if the FAA is to pursue a risk analysis, expand the study to include international application. It was further noted that this issue has been on the agenda with no action for 13 years. Monique questioned whether the FAA may be relying on global warming to resolve the issue. ACTION: AFS-410.

MEETING 06-01: Vincent Chirasello, AFS-410, briefed that the issue is not being worked due to lack of money and resources. The FAA position, as briefed at the last meeting, is to contract a risk analysis study to determine the validity of the problem and whether to address the issue through an operational or criteria solution. Lt Col Monique Yates, NGA, provided a presentation from the USAF Advanced Instrument School curriculum to demonstrate the significance of the issue. The presentation demonstrated an excellent example of the impact of cold temperature on required obstacle clearance (ROC) by approach segment using an actual approach chart and the ICAO table. In her example, assuming minimum ROC in each segment, actual obstacle clearance vs. ROC was reduced as follows: Initial segment: 235 ft vice 1000 ft; Intermediate segment 32 ft vice 500 ft; Final segment: 97 ft vice 250 ft. Monique concluded by stating that both Canada and the DOD agree that using the ICAO Cold Temperature Error Table and pilot education is a better solution to the problem and should not overly impact FAA money and resources. Contributing to the problem is that the FAA Air Traffic system is not on board. Bill Hammett, AFS-420 (ISI), asked if the USAF is implementing cold weather corrections. Monique responded, yes, at their U.S. ‘northern tier’ locations. Controllers advise pilots to implement cold temperature adjustments on initial contact and via the ATIS. Pedro Rivas, ALPA, stated that, by and large, air carriers do not apply any cold temperature correction except for FMS procedures. Paul Ewing, AJR-37 (AMTI), added that FAA MVA charts are not temperature corrected. Bill noted that from previous meetings, the Transport Canada representative stated that all MVA charts in Canada are temperature corrected. Vinnie stated that the MVA altitudes didn’t matter as the pilot didn’t know the actual MVA anyway. Richard Boll, NBAA, briefed that he received a GPWS alert while descending from 4,000 ft to 2400 ft to intercept the glide slope on the ILS RWY 19R IAP at Fairbanks Alaska at -22

degrees. When he queried the Control Tower, they responded, “It happens all the time”. Vinnie again stated that the issue should be addressed by the PARC; however, when presented, the PARC declined to accept it. Lyle Wink, AFS-400, questioned the need to adjust all procedure altitudes since most (other than the DA/MDA) are controlled by airspace requirements. Vinnie agreed stating that this would be included in the risk analysis to determine whether we have a problem. A majority of the group believe that cold temperature altimetry is a problem and a study is not needed. After more discussion, the ACF consensus is that a combination of pilot education and use of the ICAO Cold Temperature Error Table should be endorsed by FAA. Tom Schneider, as Chair of the ACF-IPG, took an IOU to write the Manager, AFS-400, emphasizing the ACF consensus and requesting that AFS-400 elevate the issue within FAA. AFS-410 is still the OPR for action. ACTION: AFS-410 and ACF-IPG Chair.
